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des Präsidenten: **Prof. Dr. E. Warming.** *des Vice-Präsidenten:* **Prof. Dr. F. W. Oliver.** *des Secretärs:* **Dr. J. P. Lotsy.**

und der Redactions-Commissions-Mitglieder:

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von zahlreichen Specialredacteuren in den verschiedenen Ländern.

Dr. J. P. Lotsy, Chefredacteur.

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Alle für die Redaction bestimmten Sendungen sind zu richten an: Redaction des Botanischen Centralblattes, Haarlem (Holland), Spaarne 17.

Miehe, H., Javanische Studien. (Abhandl. Königl. Sächs. Akad. Wiss. XXXII. p. 299–431.)

Die Beobachtungen, die den verschiedenen Arbeiten zugrunde liegen, hat Verf. im Winter 1909/10 während eines sechsmonatigen Aufenthaltes auf Java angestellt.

1. Klettereinrichtungen innerhalb der Gattung *Randia*. Die Liane *Randia scandens* (Rubiacee) entwickelt an jedem dritten Knoten zwei einander gegenüber stehende Kurztriebe, deren basales Internodium nach unten gekrümmt, der übrige Teil dagegen horizontal gerichtet ist, so dass ein deutlicher Knick entsteht. An dieser Stelle trägt der Kurztrieb einen dem Stamm zugekehrten Dorn, der einen umgewandelten Achselspross repräsentiert. Der ganze Apparat, der als Kletterorgan dient, wird vom Verf. als Doppelsperrhaken bezeichnet. Auch zahlreiche andere *Randia*-Arten klettern mittels Dornen.

2. Die Javanische *Myrmecodia*. Verf. stellte fest, dass die Warzen an den Wänden der Gänge, die sich innerhalb der Knolle befinden, Wasser aufsaugen. Er betrachtet sie daher als Absorptionsorgane und nicht als Lenticellen (Treub). Für die Richtigkeit seiner Annahme spricht auch die reichliche Aufnahme des Regenwassers durch die Knollen.

Besonders merkwürdig ist, dass die Warzen regelmässig von einem Pilze besiedelt sind. An den glatten Wänden der Gänge dagegen fehlen Pilze. Verf. hat mehrfach Pilsrasen gefunden, die wie rasiert aussahen. Wahrscheinlich hatten die Ameisen die Hyphenenden abgefressen. Der Pilz scheint (nach den Kulturen zu ur-

teilen) in die Verwandtschaft der *Cladosporium*- bezw. *Cladotrichum*-Arten zu gehören. Die Bildung der Warzen erfolgt unabhängig von dem Pilze und von den Ameisen, die die Gänge bewohnen (*Iridomyrmex*).

Dagegen bringt Verf. das Vorkommen und die Verbreitung des Pilzes mit den Ameisen in Verbindung. Die schleimigen Exkremente der Ameisen, die sich immer nur in den warzigen Kammern finden, dienen dem Pilze als Nährboden. Dass der Pilz von den Ameisen kultiviert wird, lässt sich vorläufig noch nicht beweisen. Dafür spricht aber u. a. einmal das sehr zurückgezogene Leben der Ameisen, zum andern die Tatsache, dass ihre Nahrung unbekannt ist. Sehr selten wurden Stoffe gefunden, die von aussen in die Knolle gelangt waren. Die Gänge im Innern sahen stets ebenso sauber aus wie die Oberfläche der Knolle. Als Verf. Fremdkörper auf die Knolle streute, wurden diese sofort von den hervorstürzenden Ameisen ergriffen und nach dem Rande der Knolle geschleppt, von wo sie in die Tiefe fielen. Beschädigungen der *Myrmecodia* durch Abfressen liessen sich niemals feststellen. Es scheint daher, dass den Ameisen tatsächlich die Aufgabe zukommt, die Pflanze vor Angreifern zu schützen. Andererseits scheinen die Ameisen nicht auf die *Myrmecodia* angewiesen zu sein.

3. Mikrobiologische Vorgänge im Humus einiger Epiphyten. Verf. konnte feststellen, dass in einigen der untersuchten Böden Nitrifikation stattfindet. Azotobakter wurde nicht angetroffen. Jedenfalls hat die Stickstoffbindung nur eine geringe Bedeutung für die Humusbewohner. Wichtiger ist die Aufschliessung der Zellulose, besonders mit Hinblick darauf, dass die zellulosereichen Blätter als Material der Humusbildung eine grosse Rolle spielen. Die Zellulosezersetzung ergab sich denn auch als eine sehr kräftige.

4. Die Bakterienknoten an den Blatträndern der *Ardisia crispa*. Die Bakterien (*B. foliicola*) weisen ein sehr verschiedenes Aussehen auf, je nachdem sie sich in den Knoten, an den Blatträndern oder an andern Orten entwickeln. Dass Reinkulturen nicht erzielt werden konnten, betrachtet Verf. als einen Beweis für die engen Beziehungen zwischen der Pflanze und dem Pilz. Die Knoten sind aus Hydathoden entstanden, die sich frühzeitig schlossen und dann zu Bakterienwohnstätten wurden. O. Damm.

Henslow, G., The Origin of Monocotyledons from Dicotyledons, through Self-adaptation to a Moist or Aquatic Habit. (Ann. Bot. XXV. p. 717—744. 1911.)

The author points out that this paper is to be regarded as supplementary to his earlier memoir "A Theoretical Origin of Endogens from Exogens, through Self-adaptation to an Aquatic Habit", Journ. Linn. Soc. Bot. XXIX. p. 485. 1892.)

The author deals with the question on broad lines discussing and criticising other work on the subject, more particularly Miss Sargant's papers. He brings forward evidence to show that the distinctive characters of Monocotyledons can be explained as adaptations to an aquatic habit. He holds that all terrestrial Monocotyledons are descended from aquatic ancestors, which have re-adapted themselves to aerial life. He considers that it is now proved experimentally that the dissected type of submerged foliage is "due to the degenerating effect of water upon the protoplasm of the stem",

and suggests that the pinnate or palmate forms of the leaves of some Aroids, may have been acquired "in their days of antiquity when submerged". As regards the typical monocotyledonous leaf, the author holds the view, formely propounded by de Candolle and others, that this organ is to be looked upon as homologous with a petiole only. The reticulated leaf, borne by some Monocotyledons, he believes to have been derived by expansion from the tip of this phyllodinous structure. Agnes Arber (Cambridge).

Greig-Smith, R., Contributions to our Knowledge of Soil-Fertility. N⁰. 5. The Action of Fat-Solvents upon Sewage-sick Soils. (Linn. Soc. N. S. Wales Abstr. Proc. May 31st 1912. p. III.)

Experiments are brought forward to show that the action of the volatile disinfectants upon sewage-sick soils is to segregate or translate the fatty material which, in the soil under examination, constituted 19% of the volatile and organic matter. The lower layers of treated soil gave greater bacterial growths than the upper, into which the fatty substances had been carried by the evaporating solvent. When the soil was heated at 62° C. to kill off phagocytic protozoa, subsequent treatment with chloroform caused a very much increased growth of bacteria. The work with the sewage-sick soil confirms the author's previous work upon ordinary soils.

Author's notice.

Potonié, H., Die rezenten Kaustobiolithe und ihre Lagerstätten. II. Die Humusbildungen. 1. Teil. (Herausgegeben v. d. kgl. Geol. Landesanst. H. LV, 2. 326 pp. 59 Fig. Berlin 1911.)

Wegen des bedeutenden Umfangs hat Verf. den II. Band in 2 Teile zerlegt, der vorliegende enthält das Allgemeine über Humusbildungen, sowie von den Moorbildungen die Flachmoore und Zwischenmoore. Der nächste Band wird die Hochmoore enthalten sowie das wenige über rezente Liptobiolithe. Zunächst lässt sich Verf. über unsere chemischen, leider geringen Kenntnisse der Humusstoffe aus, bespricht ihre kolloïdalen Eigenschaften, die verschiedenen Humusarten und Humifizierungsprozesse. Bei der Besprechung der misslungenen Experimente, Torf künstlich zu erzeugen, gibt Verf. seinerseits ein gelungenes Experiment bekannt, bei dem er das Pflanzenmaterial erst feucht unter Luftzutritt, dann unter Wasser (Luftabschluss) behandelte; diese genaue Nachahmung der Vertorfungsbedingungen führte zur Bildung eines dem üblichen Flachmoortorf sehr ähnlichen Materials. Es werden das Absorptionsvermögen, der Zerfall der Humusstoffe u. s. w. beschrieben. Es folgt ein Abschnitt über Inkohlung und Verkohlung, der sich wesentlich mit fossilem Material beschäftigt; für die Verkohlungsprodukte (Holzkohle) fand Verf. keinen nennenswerten Unterschied zwischen den fossilen und rezenten, im Gegensatz zu anderen Behauptungen. Die Humusprozesse werden allgemein unter Humation zusammengefasst; als Humifizierung wird die Huminbildung, als Ulmifikation Ulminbildung bezeichnet. Unter dem Abschnitt über natürliche Humuslösungen und -Niederschläge gelangen die natürlichen Schwarzwässer, der Dopplerit, doppleritische Torfe und die Ort-Bildungen (Ortstein bezw. Erde; franz. alios, engl. moorpan) zur Behandlung. Statt des

alten Ausdrucks Bleisand oder -erde wird für die ausgelaugte Schicht über dem Ortstein Bleichsand etc. gesagt. Der 3. Abschnitt ist den Humuserden gewidmet: Mullerden mit homogen zersetztem Humus (hierzu die Schwarzerden) und Modererden, bei denen der Humus noch in grösserer Menge figuriert vorhanden ist. Es folgen die Moorerde, die so oft Unklarheiten geschaffen hat; die Ort- und Bleicherden gehören auch z. T. hierher (soweit sie im Liegenden von Torf auftreten). Bei den Moderbildungen fügt Verf. seiner früheren Definition die Durchwühlung mit Regenwürmern (wie bei den Mullerden) hinzu. Besonders eingehend wird auch hier der Alpenmoder besprochen. Es folgen dann die Torfe; zunächst der Trockentorf (Rohhumus), dann der Moortorf, bei dem die sehr mannigfaltigen Torfarten aufgeführt werden, auch die durch Verschwemmung entstandenen allochthonen Torfe, die allerdings selten sind. Hierauf geht Verf. zur Beschreibung der Moore über, von denen in diesem Buch noch die Hochmoore fehlen. Es wird die Entstehung von Mooren aus verlandenden Seebecken mit dem schon früher bekannten Profil (Sapropelit—Sumpftorf — dann Torf) und die Entstehung von Mooren auf dem Trocknen wie in Nordwestdeutschland behandelt. An den Meeresküsten und den Ufern grosser Seen spielt der niedrige Strandwall eine grosse Rolle für die Moorbildung (Marschen!). Es wird dann die Einteilung der Moore nach ihrem Vegetationsbestand in Flach-, Zwischen- und Hochmoore ausführlich erläutert, ferner das Wachstum der Moore und damit Zusammenhängendes. Hierauf folgt das eigentliche Kapitel über die Flachmoore und Zwischenmoore, bei dem Verlandung u.s.w. zugleich mit zahlreichen instruktiven Vegetationsbildern im einzelnen durchgesprochen werden. Die Flachmoore werden eingeteilt in Flachmoorwiesen und Flachmoorwälder, diese wieder nach dem Grade ihrer Vernässung in Sumpfflachmoorwälder (weniger nass, besondere Pflanzengemeinschaft) und Schwingmoorwälder(-wiesen). Die Zwischenmoore werden in Birken-, Birken-Kiefernmoore und Zwischenmoor-Nadelwälder eingeteilt. Die *Taxodium*-Swamps gehören zu dem Sumpfflachmoorwäldern. Die Verhältnisse der Moore im Memeldelta, die Verf. schon früher als Paradigma oft herangezogen hat, werden auch hier häufig benutzt. Gothan.

Mc Keever, F. L., A Contribution to the Alga-Flora of Mid-Lothian. (Trans. Edinburgh Field Nat. and Microscop. Soc. VI. p. 354—374. 1911.)

The paper is a list of 180 species of *Algae* found in the county of Mid-Lothian during the years 1908—11. No *Desmidiaceae* or Diatoms are included. The most interesting records are *Phaecoccus paludosus, Phaeothamnion confervicolum, Uronema confervicolum, Hormotila mucigena, Characiopsis turgida, Desmonema Wrangelii,* and *Oscillatoria decolorata.* Numerous comments are made by the author on various points of distribution and occurrence. G. S. West.

Playfair, G. I., Polymorphism and Life-history in the *Desmidiaceae.* (Proc. Linn. Soc. N. S. Wales. XXXV. p. 459—495. pl. 11—14. 1910.)

This paper is to some extent a reply to certain criticisms of the author's previous papers regarding the growth of Desmids. In

it he describes the growth of certain species and the production of various distinct and degenerate forms. He finds that about ninety per cent of the so-called species are merely polymorphic forms of the other ten; and that it is only by tracing out their life-histories through the observation of transition-forms, that the specific connection of their innumerable variations can be established. Thus it is necessary to study the *Desmidiaceae* on the spot, by comparison of the contents of repeated gatherings from the same habitat, and this the author has done for the last fifteen years, thus arriving at the results described in this and his previous papers. The polymorphism of *Docidium trabecula* (Ehr.) is discussed and the various forms of that plant are described. Notes are also given on *Cosmarium rectangulare* Grun. and other species of Desmids, with their numerous varieties and forms. Figures are given illustrating the growth of spines and processes in *Docidium* and *Staurastrum*.

E. S. Gepp.

Welsford, E. J., The Morphology of *Trichodiscus elegans*, Gen. et sp. nov. (Ann. Bot. XXVI. p. 239—242. taf. 27. 1912.)

An alga was obtained on the sides of a glass jar containing *Azolla carolina*, which the author considers as the type of a new genus. The *Azolla* was imported from North Carolina which would therefore appear to be the original home of the alga. The alga was cultivated on cover-glasses and its general structure and reproduction worked out. It is an epiphyte belonging to the *Chaetophoraceae*, being closely allied to *Chaetonema*, *Endoclonium*, and *Pseudochaete*, and is described under the name of *Trichodiscus elegans* gen. et sp. n.

The diagnosis of the genus is as follows:

Trichodiscus, Welsford. Thallus parvus, epiphyticus, matrici arcte adpressus, discum pseudoparenchymaticum e filamentis radiantibus ramosis inter sese coalitis, ad marginem autem liberis, constitutum efformans, ramis erectis brevibus numerosis et pilis longissimis septatis ornatus; cellulae uninucleatae chromatophoro singulo parietali lobato et pyrenoideo singulo praeditae. Reproductio per zoosporas, per isogametes biciliatas, per aplanosporas, et per cellularum palmelloidearum massulas.

It was found that under the conditions of environment in which the alga was grown, both sexual and asexual reproduction occurred simultaneously.

G. S. West.

West, G. S., Algological Notes. V—IX. (Journ. Bot. p. 79—89. 6 figs. March, 1912.)

V. A Diatomaceous Earth from near Choma, in North-west Rhodesia, consisted of a freshwater deposit of recent origin in which the dominant species was *Epithemia Argus*. Less conspicuous, but almost equally numerous, were *Rhopalodia gibberula* var. *rupestris* and *R. gibberula* var. *Schweinfurthii*. These diatoms were contained in a matrix consisting of about nine other species.

VI. A note on 15 species of African Algae. *Sphinctosiphon polymorphus* G. S. West (1907) is shown to be identical with *Microcystis ochracea* (Brand) Forti. It is pointed out that *Crucigenia emarginata*, which is only known from Madagascar, is included in Migula's "Kryptogamenfl. von Deutschl., Oesterr., und der Schweiz" owing to defective information given by Chodat in his "Algues Vertes de

la Suisse" in 1902. *Spirogyra angustissima* is a new species from the vicinity of Lake Nyassa, and is the narrowest known species of the genus.

VII. A report on two collections of algae from North Queensland. The most interesting is *Micrasterias Möbii* var. *javanica* Gutw., which is redescribed and figured.

VIII. An account of the general structure and autosporeformation of *Selenastrum acuminatum* Lagerh. Chodat placed this alga in the genus *Scenedesmus* in 1902 owing to having confused it with *Scen. obliquus* var. *dimorphus*. Cultures show that *Selenastrum acuminatum* is very closely akin to *Ankistrodesmus* and is really a connecting-link between that genus and *Selenastrum*.

IX. A new species of the genus *Euastrum* from a bog near Browness in Westmoreland. G. S. West.

West, G. S., Fresh-water Algae of the Percy Sladen Memorial Expedition in South-West Africa, 1908—1911. (Ann. South African Mus. IX. p. 61—90. pl. 1—2. May, 1912.)

The collections were made mainly on the edge of the South-West African Plateau, an area with little rainfall and comparatively few places suitable for the existence of algae.

153 species were observed, of which 140 could be accurately identified. 38 species of *Myxophyceae* are recorded, and with the exception of the families *Scytonemaceae* and *Stigonemaceae* are fairly representative of the whole group. A third species of the genus *Myxobactron* (*M. hirudiforme*) is described from Mossamedes. Diatoms were abundant in all the localities from which algae were collected. The Green Algae were not very numerous, due most probably to the small rainfall and the liability of the water-holes and streams to become dry.

A new and very slender species of *Enteromorpha* (*E. gracillima*) occurred in quantity on stones in sulphureous springs.

Forming a thin green stratum, one layer of cells in thickness, on sand-grains at Mossamedes, was a small green alga which has been named *Ecdysichlamys obliqua* gen. et sp. n. It stands nearest to *Oocystis*, and the diagnosis of the genus is as follows.

Ecdysichlamys, G. S. West. Cellulae in strato mucoso viridi tenuissimo et expanso confertissime aggregatae, oblique ellipsoideae, latere una leviter convexa, latere altera valde convexa (subsemicirculari), polis minutissime apiculatis; chromatophora parietali magna et singula in cellula unaquaque, cum pyrenoide singulo (rarissime pyrenoidibus binis) conspicuo, et granulis minutissimis numerosis; nucleo singulo plerumque unilateraliter dispositis; membrana cellularum firma, indistincte lamellosa, lamellae exterae (et vetustae) plus minusve irregulariter dissociatae. Propagatio autosporis 2 vel 4 e divisione transverse vel oblique in cellula matricali ortis.

A number of Desmids were observed, of which two species of *Cosmarium* are new. G. S. West.

West, W. and **N. Annandale.** Descriptions of three new species of Algae associated with Indian Freshwater Polyzoa. (Journ. Proc. Asiatic Soc. Bengal. VII. p. 83—84. 1 pl. Calcutta, June, 1911.)

Prof. West describes the new species *Tolypothrix lophopodello-*

phila, Dactylococcopsis pectinatellophila, and *Microcystis orissica.* And Dr. Annandale adds notes on the Polyzoa with which these algae were associated more or less symbiotically. E. S. Gepp.

West, W. and **G. S. West.** A Monograph of the British *Desmidiaceae.* IV. (London, Ray Society. 1912.)

The fourth volume of this work consists of 194 pages of text accompanied by 33 plates. It contains the remainder of the British species of *Cosmarium,* all those of *Xanthidium* and *Arthrodesmus,* and the first 41 species of *Staurastrum.*

Emphasis is again laid upon the fact that the normal position of the chloroplasts of desmids is axile, and as the parietal disposition may be independently acquired by scattered species having no close relationship with each other, such a character cannot be used as a basis for the separation of either genera or subgenera.

The character accepted as of fundamental importance in the genus *Staurastrum* is the production of the angles of the semicells into hollow processes in a large number of the species. This character is therefore utilized in primarily dividing the genus into two large groups.

The following new species and varieties are described and figured: *Cosmarium Botrytis* var. *paxillosporum, C. margaritatum* forma *subrotundata, Xanthidium tetracentrotum* forma *protuberans, X. Orcadense, Arthrodesmus Incus* var. *indentatus, A. quiriferus* forma *compacta, A. phimus* var. *hebridarum, A. Bulnheimii* var. *subincus, A. subulatus* var. *subaequalis, A. tenuissimus* forma *longispina, Staurastrum orbiculare* var. *Ralfsii, St. subpygmaeum* var. *subangulatum, St. disputatum, St. punctulatum* vars. *subproductum* and *striatum, St. pilosellum,* and *St. inflatum.*

The following new combinations are also made: *Cosmarium Gayanum* var. *eboracense* (= *C. eboracense*), *C. conspersum* var. *latum* (= *C. latum*), *C. Quadrum* var. *madagascariense* (= *C. Pseudobroomei* var. *madagascariense*), *C. Quadrum* var. *sublatum* (= *C. sublatum*), *C. Logiense* forma *expansa* (= *C. latum* var. *minor*), *C. crenatum* forma *Boldtiana* (= *C. Boldtianum*), *Xanthidium Smithii* var. *majus, X. aculeatum* var. *basidentatum* (= *X. Bribissonii* var. *basidentatum*), *Staurastrum Capitulum* var. *italicum* (= *St. amoenum* var. *italicum*), *St. Capit.* var. *acanthophorum* (= *St. amoen.* var. *acanth.*), *St. Capit.* var. *tumidiusculum* (= *St. amoen.* var. *tumid.*), *St. Clepsydra* var. *sibericum* (= *St. sibericum*), *St. orbiculare* var. *hibernicum* (= *St. hibernicum*), *St. tortum* (= *Cosm. tortum*), *St. dilatatum* var. *hibernicum* (= *St. sinense* var. *hibernicum*), *St. punctulatum* var. *coronatum* (= *St. alternans* var. *coronatum*), and *St. punct.* var. *pygmaeum* (= *St. pygmaeum*). G. S. West.

West, W. and **G. S. West.** On the Periodicity of the Phytoplankton of some British Lakes. (Journ. Linn. Soc. Bot. XL. p. 395—432. pl. 19. 4 text-figs. May 1912.)

An account is given of the detailed periodicity for twelve months of the phytoplankton of Ennerdale Water, Cumberland; Wastwater, Cumberland; Loch Lomond, Dumbartonshire and Loch Katrine, Perthshire. Further comment is made upon the periodicity of the phytoplankton of Windermere, previously worked out by the authors; and incomplete accounts are

given of the periodicity observed in Lochs Earn and Lubnaig, Perthshire.

The general conclusions are not merely drawn from the data given in this paper, but also from observations on the plankton of dozens of other lakes in all the lake-areas in the British Islands.

The greatest amount of phytoplankton is found in the late summer and autumn, during the autumnal decline in temperature.

Although there are certain more or less well-marked phases in the phytoplankton, it is difficult to compare the phytoplankton of one lake with that of another, as the annual phases of one probably do not correspond with those of the other. Moreover, it is found that even in lakes situated in the same area, few species are common to all of them, and the dominant species are for the most part different.

Almost all the *Chlorophyceae* attain their maximum vegetative abundance during the autumnal decline in temperature, and the Desmids are most abundant in September (more rarely in August).

Diatoms only occur in large quantity in the contaminated lakes, and the pennate diatoms are more numerous and more conspicuous than the centric diatoms. Some species have been observed with a double maximum, one in the spring and the other in the autumn. Such are *Asterionella gracillima, Cyclotella compta,* and *Rhizosolenia morsa;* and the double maximum of the same species is regarded as of considerable interest.

Most of the *Myxophyceae* are warm-periods forms, occurring in greatest abundance in the early part of the autumnal fall in temperature. Species of *Anabaena, Aphanizomenon,* and *Oscillatoria* are for the most part only of secondary importance in the British lakes, but *Coelosphaerium Kützingianum* and *Gomphosphaeria Nägeliana* sometimes occur in such quantity as to become dominant.

Ceratium hirundinella only occurs in certain lakes and is there a summer form with a small maximum in August or September. *Peridinium Willei* is the most abundant species of the genus in the English and Welsh lakes, and is also a summer form. In the *Peridiniae* the greatest vegetative development may be attained by the various species at different times of the year.

The differences between the plankton-constituents of the lakes are partly territorial and partly local. Territorial distinctions occur in those lakes situated in drainage basins in which the rocks are older than the Carboniferous and local differences between two lakes in similar basins are frequently due to contamination of the water.

A careful study of the constituents of the phytoplankton in relation to the lake-basins has convinced the authors that the factor of greatest importance in both the qualitative distribution of plankton is the amount of dissolved salts present in the water. The highest percentage of dissolved salts is found in those lakes which are slightly contaminated from adjacent villages and farms, and in such lakes there is a greater number of diatoms than in uncontaminated lakes, and as a rule some of them are perennial constituents of the plankton. The desmid-flora of such lakes is usually poor. Uncontaminated lakes, on the other hand, contain fewer diatoms whereas the desmids are generally numerous, and there is often a rich desmid-plankton. Lakes which possess a mixed plankton are probably an intermediate character with regard to the nature and amount of the dissolved salts in the water. G. S. West.

Yendo, K., The Development of *Costaria, Undaria,* and *Laminaria.* (Ann. Bot. XXV. 99. p. 691—715. 3 pl. July 1911.)

After alluding to the work of other authors on the development of the *Laminariaceae* and the view that the spores of *Laminaria* are gametes and not zoospores, the author describes in detail the development of *Costaria Turneri,* as well as of *Undaria pinnatifida* and *Laminaria* sp., referring to some parallel accounts of other genera previously studied. He treats first of the embryonal, and then of the post-embryonal stages. His results are summarised as follows: 1. The earliest stage of development of the sporelings of the *Laminariaceae* investigated is a confervoid body growing by a single apical cell. The confervoid body becomes monostromatic in the next stage, with a monosiphonous stipe. The growth of the monostromatic blade is initiated by the two cells situated side by side at the same level beneath the apical cell, the axis of the blade passing between the two cells. 2. The monostromatic blade becomes distromatic at its base; the monosiphonous stipe becomes polysiphonous at the same time. A new meristematic tissue begins to appear at the transitional region between the blade and the stipe. 3. The growth in length ass well as in breadth is due, at a certain period, to both the apical and the stipo-frondal growth. The apical growth is gradually retarded, and finally ceases. Erosion of the apex of the blade follows next. 4. A single precortical layer of large parenchymatous cells is generated at the transitional region between the already existing two layers. The former soon becomes two-layered, and adds to the number of its layers later on. Additions of layers of cells are, as a rule, limited to, and begin at, the transitional region. 5. The hyphal cells are generated as the precortical layer becomes doubled, and the expansion of their distal ends into a trumped shape takes place at the intercellular spaces. 6. The rib and the meridional region are formed by special thickening of the cortical layers. The dorsiventrality of the lamina, if it exists, is indicated simultaneously with the formation of such parts. 7. In *Undaria* the mucilage glands are developed at an early stage, but in *Laminaria* the appearance of the lacunae does not take place before the blade has attained to a considerable length. 8. The cryptostomata in the *Laminariaceae* are not generated from a single initial cell. Each hair has its origin in an epidermal cell of equal value, except that those in the middle develop earlier than the peripheral cells. The paper is illustrated by three plates.

E. S. Gepp.

Anonymus. Fungi exotici. XIII. (Kew Bull. Misc. Inform. N°. 4. p. 189—191. 1912.)

Of the fungi described two are considered injurious parasites, namely *Pheangella Heveae,* Massee on Hevea in Nigeria, and *Colletotrichum necator,* Massee, causing the fruit of pepper to shrivel in Singapore. The other species described are: *Lepiota aurea,* Massee (Queensland), *Galera delicatula* Massee (India), *Eutypa gigaspora,* Massee (Trinidad), *Hypospila Eucalypti,* Wakefield (Queensland), *Colletotrichum Tristaniae,* Massee (Queensland), *Exipula nigro-cincta,* Massee (Java).

A. D. Cotton.

Hasse, H. E., Additions to the lichen flora of southern California. (Bryologist. XIV. p. 100—102. November, 1911.)

The following new lichens are described; *Heppia Zahlbruckneri* Hasse, and *Bacidia Kingmani* Hasse, both from the San Gabriel Range. *Caloplaca Rosei* Hasse is described from specimens collected by Dr. J. N. Rose at San Roque, Lower California. *Dirina Catalinariae* Hasse is a new species from Catalina Island, California. Maxon.

Herre, A. W. C. T., The *Gyrophoraceae* of California. (Contributions from the U. S. National Herbarium. XIII. p. 313—321. pl. 68—73. June 8, 1911.)

The author presents a synoptical treatment of the lichen family *Gyrophoraceae* as represented in California by the two genera *Gyrophora* and *Umbilicaria,* the former genus with 12 species, the latter with a single species. All the species are described, and a key to the 12 species of *Gyrophora* is presented. The range of the species is given also, with critical notes on relationship. Maxon.

Merrill, G. K., Lichen notes. N⁰. 16. (Bryologist. XIV. p. 36—38. March, 1911.)

Notes upon various lichens, including description of a new species: *Leptogium (Mallotium) pilosellum* Merrill, from Goldendale, Washington, the type being Foster's N⁰. 1186. A new form of *Alectoria jubata* is described as forma *minuscula.* One new combination appears: *Alectoria chalybeiformis* f. *nidulifera* (Norrl.) Merrill (*Alectoria nidulifera* Norrl.). Maxon.

Riddle, L. W., An enumeration of lichens collected by Clara Eaton Cummings in Jamaica. I. (Mycologia. IV. p. 125—140. May, 1912.)

The following Jamaica lichens are described as new: *Biatora amorphocarpa* Riddle, *B. endocaerulea* Riddle, *B. lanuginosa* Riddle, *Catillaria rosea* Riddle, *Megalospora Cummingsiae* Riddle, *M. jamaicensis* Riddle, *Bilimbia pallidissima* Riddle, *B. radicicola* Riddle, *B. terrestris* Riddle, *Erioderma microcarpa* Riddle, and *Buellia stipitata* Riddle.

The following new combinations are published: ?*Ocellularia anamorphum* (Nyl.) Riddle (*Thelotrema,* Nyl.), *Biatora aurigera* (Fée) Riddle (*Lecidea,* Fée), *Catillaria leptocheila* (Tuck.) Riddle (*Lecidea,* Tuck.), *Bilimbia artytoides* (Nyl.) Riddle (*Lecidea,* Nyl.), *B. thysanota* (Tuck.) Riddle (*Lecidea,* Tuck.), *Bacidia subgranulosa* (Tuck.) Riddle (*Lecidea microphyllina* var. *subgranulosa* Tuck.), *Toninia janeirense* (Müll. Arg.) Riddle (*Thalloidima,* Müll. Arg.), *Lopadium amaurum* (Wainio) Riddle (*Lecidea,* Wainio), and *Lobaria pallida* (Hook.) Riddle (*Sticta,* Hook.). Maxon.

Riddle, L. W., The rediscovery of *Parmelia lophyrea* Acharius. (Bryologist. XIV. p. 35. March, 1911.)

Notes upon the rediscovery of this exceedingly rare species by Foster in Washington. It had been known only from the original specimens gathered by Menzies over a century ago. Maxon.

Britton, E. G., Review of Dismier's revision of *Philonotis.* (Bryologist. XIV. p. 43, 44. May, 1911.)

In commenting upon Dismier's recent revision of the American species of *Philonotis,* Mrs. Britton publishes the new combination: *Philonotis longiseta* (Michx.) E. G. B. (*Bartramia longiseta* Michx.). Maxon.

Grout, A. J., Notes on Vermont Bryophytes. VI. (Bryologist. XIV. p. 52—54. May, 1911.)

Notes upon several species of *Bryophyta* which are now first recorded from the state of Vermont or which are of interest otherwise. Maxon.

Györffy, I., Novitas bryologica. (Bryologist. XIV. p. 41, 42. pl. 6. May, 1911.)

Notes upon the occurrence of a fungus, *Cladosporium herbarum* (Pers.) Link, upon leaves of *Buxbaumia viridis* Brid. The various details are illustrated. Maxon.

Hill, A. J., Notes on some of the principal mosses of the coast region of British Columbia. (Bryologist. XIV. p. 103—106. November, 1911.)

This paper is mainly descriptive of the varying habitats of many of the mosses of the region mentioned. Maxon.

Howe, R. H., A correction. (Bryologist. XIV. p. 91, 92. September, 1911.)

The author retracts an earlier published record in which *Ephebe solida* was ascribed to Mount Monadnock, New Hampshire. Maxon.

[Ingham, W.], Moss Exchange Club. (The Seventeenth Ann. Rep. York, Coultas & Volans Ltd. April 1912.)

This contains a list of the more interesting mosses and hepatics collected by the members of the Club, with critical notes appended to some of the species. A. Gepp.

Wallis, T. E., Note on *Pellia epiphylla.* (New Phytologist. X. p. 347—348. 6 figs. Cambridge 1911.)

The author describes and figures the dehiscence of the capsule of *Pellia epiphylla,* calling special attention to the dehiscence-lines. At maturity dehiscence starts at the middle of two opposite lines and spreads upwards and downwards, the capsule being thus 2-valved at first. A split then begins in the middle of each valve, eventually dividing it into two. The capsule is then 4-valved. A. Gepp.

Watts, W. W., The *Sphagna* of Australia and Tasmania.

Dr. C. Warnstorf recently published, in a bulky volume, an account of all the known *Sphagna* of the world. For the first time, therefore, it has been possible to present an authoritative list of the *Sphagna* of Australia and Tasmania. The *Sphagnaceae* are acknowledged to be a most interesting family, and Dr. Warnstorf's multiplication of varieties, forms, and subforms, will not lighten the labours of students. The Southern species have suffered less, in this

respect, than those of the Northern hemisphere, and the present paper will form a good working basis for future work.

J. H. Maiden.

Williams, R. S., *Austinella,* gen. nov. (Bryologist. XIV. p. 70, 71. text figures 1—4. July, 1911.)

Description of *Austinella* R. S. Williams, with a single species: *Austinella Rauei* (Aust.) Williams, described originally as *Syrrhopodon? Rauei* Aust. This plant, which is known only from the type station in Pennsylvania and from a single locality in Georgia, is said to have much the appearance of *Trichostomum hibernicum* (Mitt.) Dixon, which, however, is distinguished by its narrower leaf base, by having the leaf-point stouter and entire, and by having the cells papillose and rounder above. It is compared also with *Dicranum fulvum.* Maxon.

Wilson, M., Spermatogenesis in the Bryophyta. (Ann. Bot. XXV. p. 415—457. Pls. 37—38. 3 Textfigs. 1911.)

This paper opens with a summary of previous work dealing with spermatogenesis in the Bryophyta. The author then records the results of his investigations on *Mnium hornum, Atrichum undulatum,* and *Pellia epiphylla* which may be summarised as follows:

In *Mnium hornum* and *Atrichum undulatum* the divisions of the spermatogenic cells are normal, and no centrosomes are present. No reduction in the number of chromosomes takes place at the final mitosis. In *Pellia epiphylla* centrospheres and probably centrosomes are present during the later divisions in the antheridium. The blepharoplast is probably derived directly from the centrosome. In the spermatid of *Mnium hornum* a number of bodies become separated from the nucleolus. They pass into the cytoplasm and coalesce to form a hollow spherical body, for which the name "limosphere" is suggested. The nucleolus then divides into two masses, which both pass into the cytoplasm; one of these functions as the blepharoplast, while the other gives rise to the accessory body. In the spermatid of *Atrichum undulatum,* three bodies are separated from the nucleolus and pass into the cytoplasm. The body first produced functions as the blepharoplast, and the other two form the "limosphere" and accessory body. In *Pellia epiphylla* a limosphere and accessory body are present in the cytoplasm of the spermatid. Their origin was not determined. Agnes Arber (Cambridge).

Holloway, J. E., A Comparative Study of the Anatomy of Six New Zealand species of *Lycopodium.* (Transactions and Proceedings of the New Zealand Institute, New Issue, Vol XLII, p. 356—370, with 7 Text figures and pl. XXXI—XXXIV; 1909 published 1910.)

The species investigated are *Lycopodium volubile* Forst, *L. cernuum* Linn., *L. densum* Lobel, *L. laterale* R. Br., and *L. Billardieri* Spring. *L. laterale* possesses a protocorm which, in its early stages recalls that of *L cernuum;* the differentiation of the apex of the stem is, however, postponed for some time and the protocorm elongates sideways "as a rhizomatous structure", attaining in some cases to a length of 1 cm. and a thickness of 2 -3 mm. It may branch and bears numerous dorsal protophylls; the stem apex is eventually differentiated by the aggregation of some of these at a point on the

dorsal surface of the protocorm. The question whether the protocorm is a primitive organ or represents a later modification is left open and it is pointed out that even in the marsh loving *L. laterale* in which it appears to be no mere temporary organ but represents for some time the plant body, it may well be merely a physiological specialization carrying the plant over an unfavourable season. The vascular tissue of the stem passed directly into the root and did not enter the foot. The root appears late; in the two species with protocorms, *L. cernuum* and *L. laterale* it is an irregular extension of the protocorm and it is suggested that it may have originated by the irregular growth and branching of the protocorm. In these species, too, the protophylls and leaves are not very different and seem to pass gradually into one another. The vascular strands of the protophylls pass down into the protocorm where they end blindly. In these two species the leaf traces also are aggregated in an indefinite manner in the middle of the axis; later a plerome cylinder develops and leaf traces become attached indiscriminately to any point of it. Xylem and phloem are intermingled and the vascular tissue passes down into the upper part of the protocorm. In *L. Billardieri, L. volubile, L. scariosum* and presumably also in *L. densum* the vascular tissues of the stem develop before those of leaves or roots. In the first of these species the development of the stele begins by the formation of a crescentic group of protoxylem enclosing protophloem; in *L. volubile* there is at first a central protophloem group and two protoxylems, one on each side of it; in *L. scariosum* there are from the first 3—5 protoxylem groups with protophloem between them; in the earliest stage figured the latter shows a tendency to penetrate towards the centre of the circular stele. Of these two types of stele found in the young plant the author holds that the less definite form, in which the plerome cylinder develops later and the traces are attached irregularly to any portion of it, is primitive and that the more definite arrangement is a specialisation made possible by the diminution of the number of leaves owing to the adoption by the prothallus and young plant of subterranean habits.

The indefinite type of stele found in *L. cernuum* and *L. laterale* undergoes no essential change as the plant attains the mature form; phloëm and xylem remain irregularly intermingled and their positions relatively to one another are always changing; neither is there any constant relation between the protoxylem groups of the stem and the leaf traces or branches. In the cone of *L laterale,* however, the appendages are arranged in alternating whorls of three and the axial stele is consistently triarch and shows a constant relation to the traces. It was also found that the definite type of young stele showed two main types of further development; in both of these xylem and phloëm form definite bands or plates with protoxylem at the extremities; these bands are characterised by considerable definiteness though they occasionnally change in form and number owing to anastomosis. In one type, the radial banded type, the xylem bands radiate from the centre, where they may be coalescent and the protoxylem is situated at the peripheral extremity; these radial bands are separated by radial bands of phloem. This type was characteristic of *L. Billardieri;* in the second kind of banded stele, found in *L. volubile, L. scariosum* and *L. densum,* bands of xylem separated by bands of phloem lie more or less parallel to one another in the dorsal region of the stele while the radial arrangement is preserved in the ventral region owing to the frequent

giving off of adventitious roots. The parallel banded type is regarded as the deriviative form; it is developed in the ontogeny from the radial banded type; the rearrangement of the bands at the point where the one type passes into the other seems generally to occur at the branching of the stem, though it may occur elsewhere. Even in *L. Billardieri,* which has a stele of the radial banded type, the parallel arrangement often makes its appearance at the ramification of the smaller branches, but is immediately lost in the daughter branches; a parallel rearrangement of the vascular tissues is not characteristic of the main stem of this species. In *L. volubile* too, this parallel disposition of the stelar tissue when initiated at a ramification may be lost at once if the resulting branches are small. Generally speaking where there are not more than five protoxylems there is no parallel rearrangement of the dorsal part of the stelar tissue; where there are from 6—9 protoxylems such a rearrangement is frequent though not always much marked; in plants with more numerous protoxylems a parallel banding of the dorsal part of the stele is general.

Finally the author agrees with Jones that radial and parallel banded types are characteristic of orthotropic and plagiotropic stems respectively. He also shows that heterophylly originated in a different way in *L. volubile* and *L. scariosum.*

Isabel Browne (University College London).

Lang, W. H., On the Stock of *Isoëtes.* (Report British Assoc. Section K. Sheffield, 1910.)

The roots of *Isoëtes* are, as von Mohl stated, borne in regular basipetal order on a region of the stele distinct from the first and not on the secondarily modified base of the leaf bearing stem. The root bearing portion appears to be strictly comparable to the Stigmarian base of *Lepidodendron* and *Pleuromeia.*

Isabel Browne (University College London).

Maxon, W. R., Three new club-mosses from Panama. (Smithsonian Miscellaneous Collections. LVI. N°. 23. p. 1—4. pl. 1—3. textfigure. January 6, 1912.)

Three new species of *Lycopodium* are described from the high mountains of western Panama: *L. foliaceum* Maxon, *L. stamineum* Maxon and *L. Watsonianum* Maxon, all of the section *Selago.* All are illustrated. Maxon.

Sargent, C. S. et **al.,** Plantae Wilsonianae. An enumeration of the woody plants collected in western China for the Arnold Arboretum of Harvard University during the years 1907, 1908, and 1910 by E. H. Wilson. (Publ. Arnold Arboretum No. 4, part II, p. 145—312, April 30, 1912.)

Contains a critical treatment of several genera by eminent specialists and includes the following new names: *Deutzia pilosa* var. *ochrophloes* Rehder, *D. cinerascens* Rehder, *D. Bodinieri* Rehder, *D. lancifolia* Rehder, *D. crassifolia* Rehder, *D. crassifolia* var. *humilis* Rehder, *D. Henryi* Rehder, *D. aspera* Rehder, *D. calycosa* Rehder, *Hydrangea heteromalla* var. *mollis* Rehder, *Cotoneaster apiculata* Rehder and Wilson, *C. nitens* Rehder and Wilson, *C. divaricata*

Rehder and Wilson, *C. acutifolia* var. *villosula* Rehder and Wilson, *C. acutifolia* var. *laetevirens* Rehder and Wilson, *C. ambigua* Rehder and Wilson, *C. reticulata* Rehder and Wilson, *C. obscura* Rehder and Wilson, *C. obscura* var. *cornifolia* Rehder and Wilson, *C. foveolata* Rehder and Wilson, *C. bullata* var. *macrophylla* Rehder and Wilson, *C. Dielsiana* var. *elegans* Rehder and Wilson, *C. gracilis* Rehder and Wilson, *C. racemiflora* var. *microcarpa* Rehder and Wilson, *C. hupehensis* Rehder and Wilson, *C. multiflora* var. *calocarpa* Rehder and Wilson, *C. tenuipes* Rehder and Wilson, *C. glabrata* Rehder and Wilson, *C. salicifolia* var. *rugosa* Rehder and Wilson, *C. salicifolia* var. *floccosa* Rehder and Wilson, *C. Henryana* Rehder and Wilson (*C. rugosa* var. *Henryana* Schneider), *C. rhytidophylla* Rehder and Wilson, *C. microphylla* var. *cochleata* Rehder and Wilson (*C. buxifolia* f. *cochleata* Franchet), *C. microphylla* var. *vellaea* Rehder and Wilson (*C. buxifolia* f. *vellae* Franchet), *C. breviramea* Rehder and Wilson, *Crataegus hupehensis* Sargent, *C. kulingensis* Sargent, *C. Wilsonii* Sargent, *C. chitaensis* Sargent, *C. Komarovii* Sargent (*C. tenuifolia* Komarov, non Britton), *Photinia Davidsoniae* Rehder and Wilson, *P. villosa* var. *sinica* Rehder and Wilson, *P. Beauverdiana* var. *notabilis* Rehder and Wilson (*P. notabilis* Schneider), *P. Schneideriana* Rehder and Wilson, *P. subumbellata* Rehder and Wilson, *P. amphidoxa* Rehder and Wilson (*Stranvaesia amphidoxa* Schneider), *P. glomerata* Rehder and Wilson, *P. lancifolia* Rehder and Wilson, *P. berberidifolia* Rehder and Wilson, *Stranvaesia Davidiana* var. *undulata* Rehder and Wilson (*S. undulata* Decaisne), *S. nussia* var. *oblanceolata* Rehder and Wilson, *Eriobotrya grandiflora* Rehder and Wilson, *E. prinoides* Rehder and Wilson (*E. bengalensis* Dunn, non Hook. f.), *Prunus Padus* var. *pubescens* f. *Purdomii* Koehne, *P. pulchella* Koehne, *P. conadenia* Koehne, *P. pleiocerasus* Koehne, *P. macradenia* Koehne, *P. discadenia* Koehne, *P. tatsienensis* var. *stenadenia* Koehne, *P. variabilis* Koehne, *P. pilosiuscula* Koehne (*P. tatsienensis* var. *pilosiuscula* Schneider), *P. pilosiuscula* var. *barbata* Koehne, *P. pilosiuscula* var. *media* Koehne, *P. pilosiuscula* var. *subvestita* Koehne, *P. polytricha* Koehne, *P. Rehderiana* Koehne, *P. litigiosa* var. *abbreviata* Koehne, *P. involucrata* Koehne, *P. malifolia* Koehne, *P. cyclamina* Koehne, *P. Dielsiana* var. *laxa* Koehne, *P. plurinervis* Koehne, *P. hirtifolia* Koehne, *P. tenuiflora* Koehne, *P. concinna* Koehne, *P. Twymaniana* Koehne, *P. Conradinae* Koehne, *P. Helenae* Koehne, *P. saltuum* Koehne, *P. serrula* var. *tibetica* Koehne (*P. puddum* var. *tibetica* Batalin), *P. droseracea* Koehne, *P. trichostoma* Koehne, *P. latidentata* Koehne, *P. micromeloides* Koehne, *P. oxyodonta* Koehne, *P. glyptocarya* Koehne, *P. lobulata* Koehne, *P. pleuroptera* Koehne, *P. Zappeyana* Koehne, *P. Zappeyana* var. *subsimplex* Koehne, *P. gracilifolia* Koehne, *P. Rossiana* Koehne, *P. glandulosa* var. *trichostyla* Koehne, *P. glandulosa* f. *Faberi* Koehne, *P. tomentosa* var. *endotricha,* Koehne, *P. tatsienensis* var. *adenophora* Koehne (*P. Maximowiczii* var. *adenophora* Franchet), *P. venusta* Koehne, *P. Macgregoriana* Koehne, *P. Henryi* Koehne (*P. yunnanensis* var. *Henryi* Schneider), *P. neglecta* Koehne, *P. scopulorum* Koehne, *P. glabra* Koehne (*P. hirtipes* var. *glabra* Pampanini), *P. Schneideriana* Koehne, *P. Duclouxii* Koehne, *P. ampla* Koehne, *P. malifolia* var. *Rosthornii* Koehne, *P. cyclamina* var. *biflora* Koehne, *P. Dielsiana* var. *conferta* Koehne, *P. pseudocerasus* f. *virescens* Koehne, *P. serrulata* f. *albida* Koehne (*P. pseudocerasus* f. *albida* Makino), *P. Wildeniana* Koehne, *P. Leveilleana* Koehne, *P. Sontagiae* Koehne, *P. mesadenia* Koehne, *P. parvifolia* Koehne, (*P. pseudoce-*

rasus var. *parvifolia* Matsumura), *P. parvifolia* f. *aomoriensis* Koehne, *P. majestica* Koehne, *P. trichantha* Koehne, *P. Henricqiana* var. *biloba* Koehne (*P. biloba* Franchet), *P. microlepis* Koehne, *P. microlepis* var. *ternata* Koehne, *P. phyllopoda* Koehne, *P. Veitchii* Koehne, *P. podadenia* Koehne, *P. iwagiensis* Koehne, *P. autumnalis* Koehne (*P. subhirtella* var. *autumnalis* Makino), *P. nikkoensis* Koehne, *P. Tschonoskii* Koehne, *P. glandulosa* var. *glabra* Koehne (*P. japonica* ß *glandulosa* Maximowicz), *P. glandulosa* f. *Sieboldiana* Shirai, *P. glandulosa* subf. *alba* Koehne, *P. glandulosa* subf. *rosea* Koehne, *P. glandulosa* f. *albiplena* Koehne, *P. glandulosa* var, *Purdomii* Koehne, *P. glandulosa* f. *packangensis* Koehne (*P. japonica* var. *packangensis* Schneider), *P. glandulosa* f. *sinensis* Koehne (*P. sinensis* Persoon), *P. glandulosa* var. *salicifolia* Koehne (*P. japonica* var. *salicifolia* Komarov), *P. pogonostyla* var. *globosa* Koehne, *P. pogonostyla* var. *obovata* Koehne, *P. japonica* var. *eujaponica* Koehne, *P. japonica* f. *Fauriei* Koehne, *P. japonica* f. *Oldhamii* Koehne, *P. japonica* var. *gracillima* Koehne, *P. japonica* f. *Thunbergii* Koehne (*P. japonica* var. *Thunbergii* Koehne), *P. japonica* f. *Engleri* Koehne (*P. japonica* var. *Engleri* Koehne), *P. japonica* f. *minor* Koehne, *P. japonica* f. *sphaerica* Koehne (*P. japonica* var. *sphaerica* Carrière), *P. japonica* var. *Kerii* Koehne (*P. Kerii* Steudel), *P. carcharias* Koehne, *P. tomentosa* var. *Spaethiana* Koehne, *P. tomentosa* var. *Graebneriana* Koehne, *P. tomentosa* var. *insularis* Koehne, *P. tomentosa* var. *Souliei* Koehne, *P. tomentosa* var. *Kashkarovii* Koehne, *P. tomentosa* var. *breviflora* Koehne, *P. tomentosa* var. *trichocarpa* Koehne (*P. trichocarpa* Bunge), *P. tomentosa* var. *tsuluensis* Koehne, *P. tomentosa* var. *heteromera* Koehne, *P. Batalinii* Koehne (*P. tomentosa* var.? *Batalinii* Schneider), *P. dehiscens* Koehne, *P. mira* Koehne, *P. tangutica* Koehne, (*Amygdalus communis* var. *tangutica* Batalin), *P. platysepala* Koehne, *P. gymnodonta* Koehne, *P. triflora* var. *pubipes* Koehne, *P. anomala* Koehne, *P. mume* var. *Goethartiana* Koehne, *Xylosma racemosum* var. *pubescens* Rehder and Wilson, *Stachyurus yunnanensis* var. *pedicellatus* Rehder, *Styrax dasyanthus* var. *cinerascens* Rehder, *S. Hemsleyanus* var. *griseus* Rehder, *S. Perkinsiae* Rehder, *S. Wilsonii* Rehder, *Syringa Sargentiana* Schneider, *S. verrucosa* Schneider, *S. tetanoloba* Schneider, *S. Rehderiana* Schneider, *S. Wilsonii* Schneider, *S. microphylla* var. *glabriuscula* Schneider, *S. Meyeri* Schneider, *Forsythia suspensa* f. *pubescens* Rehder, *F. suspensa* var. *latifolia* Rehder, *Sambucus Schweriniana* Rehder, *S. Hookeri* Rehder (*S. javanica* Hook. f. and Thomson pp., non Reinwardt), *Viburnum calvum* Rehder, *V. laterale* Rehder, *V. erosum* var. *Taquetii* Rehder, *Leycesteria formosa* var. *stenosepala* Rehder. J. M. Greenman.

Schwappach, A., Keimprüfung der Koniferensamen. (Jahresber. Vertr. ang. Bot. VIII. p. 260. 1911.)

Eine möglichste Uebereinstimmung der Keimprüfungsanstalten hinsichtlich der von ihnen anzuwendenden Methoden ist zu erstreben; ferner bezeichnet Verf. es als erforderlich, die Ergebnisse in den Keimapparaten durch Aussaaten im Freien zu ergänzen.

G. Bredemann.

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